

PHYTOREMEDIATION STUDIES OF FOREST PLANTS GROWING IN AND AROUND URANIUM TAILING PONDS IN JADUGUDA, JHARKHAND, INDIA - A CASE STUDY

C. Muralidhar Rao¹ and G. Sudhakar²

Officer on Special Duty, Environmental Management Cell

¹*Atomic Minerals Directorate for Exploration & Research, Hyderabad*

²*Former Director, Environmental Protection Training and Research Institute, Hyderabad.*

E-mail: murali.ifs@gmail.com, sudhakargifs@gmail.com

Abstract

Radionuclide and metal pollution is a global environmental problem and the number of contaminants entering the environment has increased greatly in recent times due to increased mining activities. Uranium mill tailings are the powdered rock residues obtained after uranium extraction by hydrometallurgical process from Uranium ores. The tailing effluents and solids from the mill are discharged as a slurry to a waste retention pond, the tailing pond. A study was undertaken for a period of three years to evaluate the potential of native plant species for phytoremediation of tailing ponds of the Uranium mines at Jaduguda in Jharkhand state. Electrical conductivity (EC), pH of the tailings and metals like Al, V, Cr, Mn, Fe, Ni, Cu, Zn, As, Se, Cd, Pb and the 3 radionuclides (Co, Sr and U) were analysed. From the analysis of sediment/soil/water/effluent of tailing ponds, eight elements (Al, U, Mn, V, Fe, Ni, Cu and Zn) were found to be significantly in higher concentrations in the tailing soils. U and Mn were found to be the predominant contaminants. Twenty six native forest plant species were screened for their ability to accumulate and remediate the contaminated soils. Considering various factors of suitability of the plant species for phytoremediation, four plant species viz; *Saccharum spontaneum* (Al 54 ppm, Mn 31 ppm, U 8 ppm, Cr 16 ppm), *Typha latifolia* (Cr 2 ppm, U 3 ppm, Mn 68 ppm, Sr 2 ppm, Pb 3 ppm), *Pteris vittata* (Mn 211 ppm, Pb 4 ppm, U 4 ppm) and *Cyperus compressus* (U 2 ppm, Mn 76 ppm) are found to hold good potential for phytoremediation of heavy metals and radionuclides from tailings of the Jaduguda uranium mine.

Keywords: Uranium; Tailing pond; Bioremediation; Phytoremediation; Nuclear wastes; Radionuclide; Trace metals.